CORN GROWING IN MANITOBA

BY

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DOMINION EXPERIMENTAL FARMS

E. S. ARCHIBALD, Director

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Contrary to general belief corn has been grown in Manitoba for almost one hundred years and in all probability it was cultivated by the Indians before the territory was settled by the white man.

Alexander Ross, writing in 1852 of the manner in which the half breeds lived at the time says: "The women, using a hoe, usually planted each year a few grains of Indian corn and sometimes a few seed potatoes which in spite of all will grow to maturity."

Further historical records of interest are found in Hind's "Narrative of the Canadian Red River Exploring Expedition of 1857," published in London in 1860. In writing of the Portage La Prairie district, he says: "In order to reach John Spence's house I passed through a field of Indian Corn and from the proprietor I obtained the following statement." '"The kind of Indian Corn most common in the settlement is called Horse-teeth corn and does not always ripen."' The variety sown by Spence he termed Mandril corn which was procured from the Indians at the head waters of the Missouri." This Mandril corn is most likely the variety known as Mandan and would be obtained from the famous Mandan tribe of Indians.*

As the country became occupied and the number of live stock increased the need for forage crops became more urgent and the growing of corn as a fodder became more general. At first it was stooked in the autumn and fed during the winter months. Then upright silos were introduced on a few farms, and more recently the trench silo. The acreage of corn increased steadily until 1924 when there were 60,000 acres planted in the province; since that time there has been a general decrease, and in 1928 there were only 18,536 acres of corn. One reason for the decrease was the discouragement of the farmers which followed the corn failure of 1924. Another contributing factor was the introduction of sweet clover which has been used in many places to replace corn. This was natural since in recent years there have been plentiful summer rains. Under these conditions sweet clover produces large yields of fodder.

Lastly corn in Manitoba has frequently received less attention from a cultural standpoint that it deserves. It has been grown on damp, unfavourable and dirty ground. Southern seed, which is not adapted and has not been acclimatized, has been used. Planting has been late, cultivation neglected, and harvesting deferred until the corn has been damaged by frost.

REASONS WHY CORN SHOULD BE GROWN

Corn possesses many useful characteristics that warrant its production on many live stock farms of Manitoba, particularly in the districts favourable to its production. Few of the reasons for growing this forage are as follows:—

1. A large amount of valuable feed can be grown on a comparatively small piece of land.
2. The corn crop leaves the land in better condition for succeeding grain crops than do most other intertilled crops provided weeds have been controlled.

* Thanks are due W. J. Healy, Provincial Librarian, who supplied historical references.

3. Corn can be fed green in the fall to keep up the milk flow of the dairy herd; later in the year it can be made into succulent silage or fed whole or cut as dry sheaves.
4. Dwarf, early maturing varieties of corn make excellent pasture for hogging off.
5. Corn does not develop dangerous poisonous moulds as easily as most other crops, when made into silage.
6. Corn silage is usually more palatable than other silage used on the prairies.

CORN GROWN SUCCESSFULLY IN MANY DISTRICTS

The weather is the one factor in crop production over which man has no control If the climate is not favourable to a particular crop or variety it is impossible to grow it successfully. Weather records have been kept at the Experimental Farm, Brandon, since 1889. The following table shows the date of the last frost in the spring and the first frost in the fall for the years 1909 to 1928.

DATES OF SPRING AND FALL FROSTS AT BRANDON 1909-1928

—	Last spring frost	Temperature	First autumn frost	Temperature	Frost free days
1909	June 14	28	Aug. 29	30	76
1910	June 6	30	Aug. 31	30	86
1911	May 21	30	Sept. 25	21	127
1912	May 15	27	Sept. 23	29	131
1913	May 19	29	Sept. 20	30	124
1914	May 23	30	Aug. 26	29	95
1915	May 20	28	Aug. 24	29	96
1916	June 4	30	Sept. 2	30	90
1917	June 21	29	Aug. 28	29	68
1918	May 25	27	Sept. 2	24	97
1919	June 9	31	Sept. 25	31	108
1920	May 27	31	Aug. 21	.....	86
1921	June 3	31	Sept. 15	30	104
1922	May 19	31	Sept. 16	30	120
1923	May 19	29	Aug. 24	30	97
1924	June 11	31	Sept. 21	27	102
1925	May 25	30	Sept. 11	28	109
1926	May 19	27	Sept. 12	30	116
1927	June 4	31	Sept. 22	29	110
1928	May 12	25	Aug. 24	29	104
Average	May 28	.....	Sept. 7	.....	102·3

For the twenty-year period listed in the foregoing table there was an average of 102·3 days between the last frost in the spring and the first frost in the fall. Northern selected strains and varieties will attain a high degree of maturity in this length of time in an average season. Varieties of corn adapted to the south require 120 to 160 frost free days as well as hot summer weather. Such late maturing varieties would fail to attain any degree of maturity under our conditions.

For the last three years co-operative corn tests have been carried on with a number of farmers in the various districts of Manitoba. The results obtained indicate that there are certain sections where corn thrives well and other places where greater care is necessary to grow a profitable crop. Generally corn can be grown in the southern part of the province and in the central and more northernly parts, when care and attention is paid to the selection of the proper varieties, the kind of soil and the topography of the land. A southern exposure warms up more quickly in the spring and is usually more favourable to corn than a level or northern exposure.

CORN AS A SUBSTITUTE FOR SUMMER-FALLOW

The system of summer-fallowing, which has given such good results in western Canada, is not without its faults. So long as land is cheap and abundantly fertile, it is a very satisfactory means of keeping up the yield of grain. But with land becoming more expensive and at the same time its virgin fertility being depleted, some system needs to be adopted that is less extravagant of soil fertility than straight grain-growing and summer-fallow. While it is possible to adopt a rotation that provides for the use of barnyard manure without including corn, still, the addition of corn makes it more practicable and better balanced. The principal advantage that corn has over summer-fallow is in making possible the profitable use of the land every year. Summer-fallowing may insure an excellent crop of grain the following year, but it does so at the loss of a year's use of the land.

The corn crop on the other hand should pay for the use of the land and for most of the work expended on it, and the crop following corn will be almost equal to that grown on summer-fallow. The yield in bushels will probably be slightly less but the crop ripens several days earlier and it is much easier to handle on account of the shorter, stiffer straw.

CORN IN THE ROTATION

Rotation of crops is one of the most needed improvements in Manitoban agriculture, and corn is a crop that lends itself most readily to use in a rotation. When corn is grown so as to get the best possible results from the corn itself, it also gives the best conditions for the crops that follow. It serves well as a cleaning crop, and, as has been shown, may act as a substitute for summer-fallow. Being a gross feeder it can make excellent use of manure, rotting sod or other humifying material. A heavy application of manure may cause too great a growth of leaf and stem in grain, causing lodging and lateness, but there is no such danger with corn; the more leaves it produces the better. It helps to decay the manure, which is also mixed through the soil by the cultivation, so that the grain that follows corn gets as much benefit from the manure as though it had received it directly and, in many instances, the effect on the grain is much better.

Just what rotation should be used will depend on circumstances, such as location, and the system of farming to be followed. For the man who wishes to grow a considerable amount of wheat, something different is required than for the out-and-out dairyman or stock raiser. The following is a good rotation which gives two-fifths of the land to wheat:—

1st year—Wheat.
2nd year—Wheat.
3rd year—Corn.
4th year—Oats or barley (seeded down).
5th year—Hay.

This is the old Norfolk rotation with corn instead of turnips and an extra crop of wheat added. For the dairyman who wants less wheat, it would be an improvement to drop the extra year of wheat. This rotation makes no provision for pasture, and is therefore suitable only for a farm where there is enough permanent pasture. The additions of another year, i.e., 6th year, Pasture, would make provision for pasture where it was needed.

The following is an outline of a six-year rotation that has been under trial at Brandon Experimental Farm for some years:—

1st year—Wheat, seeded down.
2nd year—Hay.
3rd year—Hay (break up).
4th year—Wheat.
5th year—Oats.
6th year—Corn and summer-fallow.

In this rotation wheat is sown on the best land. The two years in Hay should result in the fibre being well maintained in the soil. A disadvantage is that the corn following two crops of grain may be difficult to keep free from weeds, but by putting the corn on the cleanest part of the field this difficulty may be overcome. The remainder of the field will be summer-fallow.

A third arrangement slightly different to the preceding one is: —

1st year—Wheat.
2nd year—Coarse grains, part of land seeded down to sweet clover.
3rd year—Corn, sweet clover and summer-fallow.

CHOICE OF VARIETIES

Success in corn growing is primarily dependent on the choice of a suitable variety or strain. It is generally conceded that for ensilage purposes the most profitable and productive crop is obtained from a variety or a strain that will reach the glazing stage in the locality in which it is to be grown.

There is probably no other crop that shows as much variation within a variety as does corn; this is due mainly to the fact that there is a general mixing of varieties and strains by cross pollination. There is often more difference between strains of the same variety than between varieties. At this Farm in 1928 a Manitoba selection of Northwestern Dent had reached the glazing stage when a South Dakota strain was in the water stage.

The following varieties are considered suitable for silage production:—

Southern Area.—Falconer, Minnesota 13 (Haney strain), Northwestern Dent (Wills), Northwestern Dent (North Dakota).

Northern Area.—Manitoba Flint, Quebec 28, Minnesota 23, Northwestern Dent (Brandon).

Unsuitable Varieties.—Longfellow-Minnesota No. 13 (Southern origin), Northwestern Dent (South Dakota or Nebraska).

SEED TESTING

Seed corn should be tested for germination before being used. Corn is very often lacking in vitality owing to bad weather, bad storage, immaturity or other causes. In purchasing seed corn it is advisable to secure from the vendor the germination percentage of the crop. Home-grown seed can be tested by the grower by counting out one hundred or two hundred seeds of average appearance and rolling them up in a wet cloth. The cloth should be kept moist and at a uniformly warm temperature for about ten days or until all the viable seeds have been sprouted. The Dominion Seed Branch have laboratories for testing seeds at Winnipeg, Saskatoon and Calgary.

PREPARATION OF LAND

For some years corn has frequently been recommended as a summer-fallow substitute or cleaning crop and a number of farmers have become discouraged trying to use it in this way on very dirty land, when they did not have sufficient help to keep the weeds in control. Since a large quantity of feed can be grown on a few acres the farmer will often find it advisable to grow corn on land that is comparatively free from weeds; this will reduce the amount of cultivation and hand hoeing, to a minimum. Corn will also thrive on well prepared breaking or after sweet clover.

When corn follows grain the stubble should be ploughed in either fall or spring. Very heavy soils are usually best ploughed in the fall so that the lumps will be disintegrated during the winter. The prime object is to have a well prepared seed bed in which to plant.

Barnyard manure is often ploughed under just before corn in a crop rotation. By applying manure at this time it becomes incorporated into the soil. An experiment conducted at the Experimental Farm, Brandon, to determine the advisability of applying manure for corn gave the following results:—

APPLICATION OF BARNYARD MANURE FOR CORN

Treatment	Yield of fodder, 4-year average	4-year average yield per acre of wheat sown after corn
	tons lb.	bush.
Check—No fertilizer	12 1,402	29·6
Barnyard manure—8 tons per acre	13 830	31·2
Barnyard manure—16 tons per acre	13 495	32·0

The results in the above table indicate that a moderate application of manure appears to be beneficial. From observations made on the experiment it would seem that the maturity of corn was hastened by the application of manure. The succeeding crops also appeared to benefit from the application of manure. Wheat following corn where no manure was applied yielded 29·6 bushels. Where eight tons of manure were used the yield was 31·2 bushels, and where sixteen tons of manure were applied, 32·0 bushels. The land where these tests were conducted is fairly rich. A greater increase in yields from the application of manure might be expected on lighter, poorer soils.

METHODS OF PLANTING

Most of the corn in Manitoba is planted with the ordinary grain drill. So long as the land is not very foul with weeds this is a perfectly satisfactory method of planting. It is the quickest method that can be used. In seeding with the grain drill approximately one-half bushel seed per acre is necessary to produce an even stand. The smaller seed of northern grown strains are likely to feed more rapidly through the drill and less than half a bushel per acre of this seed may be sufficient. When the drill is employed only enough spouts are used to allow the planting of corn in rows 3 or 3½ feet apart. A hopper-like structure can be made out of cardboard to place above and hold the corn for each spout in use. The cardboard is first cut and shaped into a box-like structure five inches square and eight inches long, leaving the ends

open. One of these is fitted into the drill feed box above each spout that is to be used and is tacked down to hold it in place. Corn to be seeded is then filled into this receptacle. By those who have used this method it is considered easier than stopping all spouts excepting those used for sowing the corn.

If it is desired to cultivate the field afterwards with a four-horse duck-foot cultivator with some of the feet off, the two machines should be gotten together before seeding and compared. It will sometimes be found possible to sow with the drill spouts so spaced that, afterwards, the cultivator can follow without either horses or wheels going on the rows of corn, and with some feet removed to allow for the rows. The drill should be set to drop the grains of corn six inches or less apart. It should be tested on a hard road or yard before being used in the field.

Fig. 1.—The corn planter at work on the Experimental Farm, Brandon, Manitoba.

The corn drill is made specially for planting corn either in rows or in hills. For planting in rows, it has little advantage over the grain drill, and would hardly justify its cost. Where corn is to be used on a large scale as a cleaning crop instead of summer-fallow, it will pay to have a corn drill, and to plant in hills so as to be able to cultivate in both directions. In planting in hills, either with corn drill or hand planter, from three to six grains should be dropped in each hill. In planting in hills one bushel will sow approximately five acres.

Experiments have been conducted at this Experimental Farm for a considerable number of years, in which planting in hills has been compared with planting in rows.

The average results for a nine-year period show very little difference in yield of forage or stage of maturity reached between corn grown in hills and grown in rows. It is recognized, however, that it is easier to keep the land clean when the corn is in hills and most of the cultivation can be done with horses.

TIME OF PLANTING

Until comparatively recent years it was considered dangerous to plant corn before May 24. This is still true in the northern areas of the province and on the heavy late cold soils. In the southern part of the province and on southern slopes which warm up early in the spring it would seem advisable to sow corn somewhat earlier (about May 15). Good seed of northern-grown early-maturing strains which have the ability to germinate at low temperatures will not rot when planted early. (See fig. 2.)

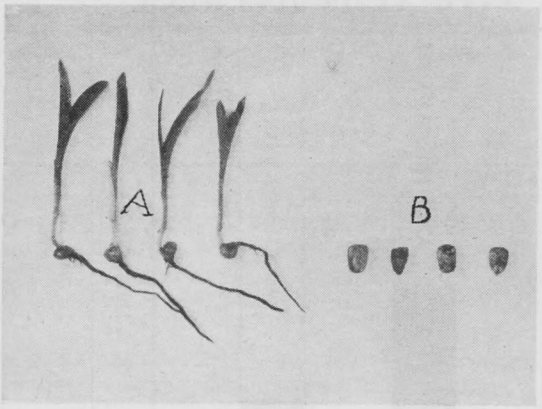


Fig. 2.—(*a*) Brandon strain of Northwestern Dent. (*b*) Leaming. Planted April 16, photographed May 12.

The fact that late-planted corn grows more quickly than early-planted corn has caused many to conclude that nothing is gained by early planting. An experiment in dates of planting corn made at the Dominion Experimental Farm, Brandon (see chart 1), indicates that the earlier corn is planted the more mature it is at harvest. This is a very important factor since it has been found by chemical analysis that a mature corn crop will produce more of the essential food elements per acre than will one that is immature.

INTERTILLAGE

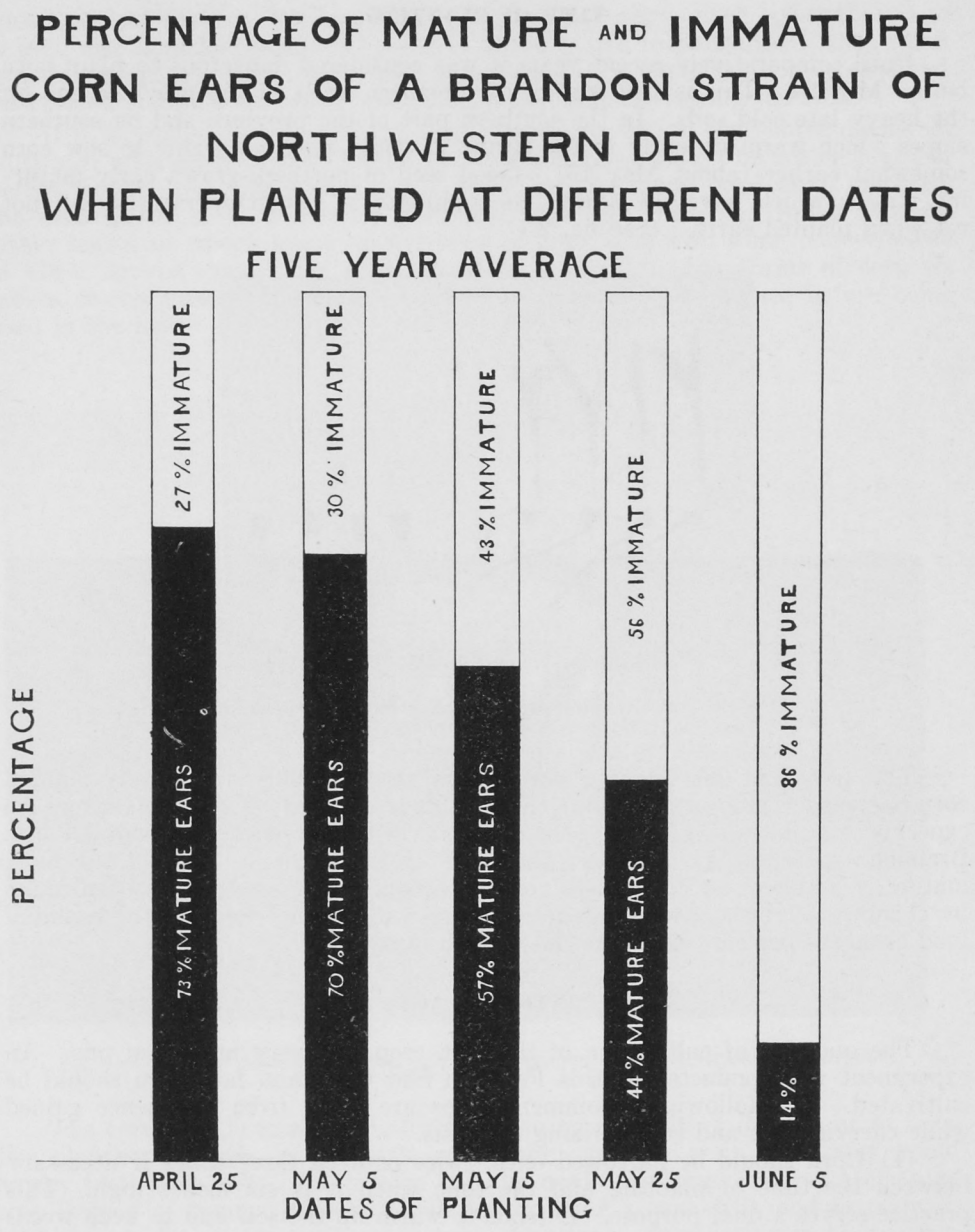
The question of cultivation of the corn crop is a very important one. An experiment was conducted at this Farm to find when and how corn should be cultivated. The following recommendations are made from experience gained while carrying out and summarizing the tests.

(1) Corn should be harrowed once, twice or even three times if necessary between the time of planting and the time when it is six inches high. This practice serves a dual purpose. It tends to warm up the soil and to keep weeds in check.

(2) From the time corn is six inches high till the time of tasseling, it should be cultivated often enough to keep weeds down and also after rains to warm and aerate the soil. This is necessary because corn does not do well in cold, soggy ground.

(3) Shallow cultivation is better than deep cultivation, especially after the crop is well established. Deep intertilling breaks and kills the shallow roots.

(4) In heavy soils, especially after the corn is two or three feet high, care is necessary to cultivate at the right time. If the ground is allowed to bake cultivation will do more harm than good as the land breaks into clods allowing the air to penetrate and dry out the soil.



Graph showing the per cent of mature and immature ears, for the average of five years at different dates of planting, when the Brandon strain of Northwestern Dent was used for seed.

UTILIZING THE CORN CROP

Fodder corn is utilized in one or more of the following three ways on the average farm: (1) Dried in stooks and left standing until required for feeding, (2) For ensiling, (3) For hogging off.

CORN DRIED IN STOOKS

Where few animals are kept and only a small acreage of corn is grown, it can be harvested and dried in stooks. Each stook should contain about twenty

sheaves. When corn is well cured in this manner it makes a feed which is readily eaten by all farm stock, especially if put through a cutting box. The feeding value, however, is not as high as when made into ensilage.

CORN FOR ENSILING

Rapid strides have been made in the use of a structure designed to preserve food in a green and succulent form. It is not known when the method of ensiling green feed in a trench or pit silo originated, but Shaw states that it was possibly the outcome of a practice among the ancients of hiding food from their enemies. One of the first upright silos ever built was erected by V. E. Fuller, then of Hamilton, Ontario, in 1881. Since that time the use of the silo has passed through the experimental stage in Canada and it is now recommended wherever a large or even a medium sized acreage of corn is grown. For the last ten years a great deal of publicity has been given to the trench silo due to the fact that it can be built with very little cash outlay. This type of silo consists of a trench six to eight feet deep, about twelve feet wide and as long as desired depending on the amount of silage to be kept. After a silo of this type is filled, about eighteen to twenty-four inches of wet straw from a stack bottom, or other waste material should be tightly packed on top of the silage. Excellent silage has been made in the trench silo and one can be constructed wherever good drainage to a depth of ten feet exists. (See fig. 3.)

Corn silage is a palatable, nutritious and succulent food which acts also as a tonic in the winter ration. It sustains the milk flow in dairy herds and improves the general health of young stock, freshening stock and beef animals, enabling them to utilize cheap roughages and make steady winter gains.

Fig. 3.—Emptying the trench silo, Experimental Farm, Brandon. (Shaw—Soiling Crops and the Silo, 1919. Orange Judd Book Co., New York.

Silage may also be fed to sheep, and in limited amounts to idle horses. At this Farm pregnant ewes are fed from one-half to two and a half pounds daily. From information gained in a feeding test, a mixture of corn silage and oat straw gave more economical gains for fattening lambs than did hay. At the Experimental Farm, Brandon, the value of silage is portrayed in the fact that it has been used consistently as the main part of the winter ration for the herd since the first silo was built in 1895.

CORN FOR HOGGING OFF

The acreage of corn that can be used for hogging off is comparatively small. As a general rule one acre is planted for every five to seven pigs. In an experiment made at the Brandon Farm the following treatment gave very satisfactory results. The pigs were turned into the corn field about August 16. Previous to this they were fed green corn with their meal for a few days in order to gradually change the ration from dry meal to green corn. Tankage was supplied in a small self-feeder in the corn field and the hogs had access to water continuously. The pigs were left in the corn field with this treatment for sixty-seven days. Hogging off corn in this manner is regarded as sound practice for either the growing or finishing of hogs. It proved slightly more profitable for finishing, however, than for the production of growth.

SEED CORN PRODUCTION

The advisability of producing seed corn was at one time questioned. It is now agreed that on warm mellow soils in Southern Manitoba and on southern slopes in Central Manitoba it can be produced successfully.

In producing seed corn it is advisable to give more attention to the earliness and adaptability of a strain to the soil and climate where it is to be grown than to a varietal name. The longer a corn is grown in the same locality the better adapted it becomes to the conditions of that locality provided good seed is selected each year.

The following varieties are considered suitable for seed production in the areas mentioned:—

Southern Area.—Manitoba Flint, Quebec 28, Minnesota 23, (Haney) Northwestern Dent (Brandon) Pioneer.

Northern Area.—Manitoba Flint, Early Strains Gehu and Howes.

Hogging off varieties.—Manalta and Howes are both very early. Of the commercially available varieties Squaw and Gehu.

Very little seed corn has hitherto been produced in Manitoba. On the Brandon Experimental Farm during the past two years an acre of Northwestern Dent has been set aside for seed production and records have been kept both of the yields and cost of production. The yields for the years 1927 and 1928 are given below:—

YIELDS OF SEED CORN AT BRANDON

—	Yield 1928		Average 1927–28	
	bush.	lb.	bush.	lb.
Seed corn shelled	28	17	21	33
Feed corn shelled	6	17	5	36
Total shelled corn per acre	34	34	27	13

WHAT TYPES TO SELECT

By continuous selection of ears from the right type of plant a strain of corn can be kept up to standard and might in some cases be improved. Earliness is the most important factor to select for. Together with earliness, however, the parent plant should have erect, strong stalks and be free from smut and other diseases. The ears should be borne between two and three feet from the ground at an angle of 45° to 90° from the main stem.

The Brandon strain of Northwestern Dent previously mentioned was obtained by selecting the strong, earliest maturing plants for eight years.

WHEN TO SELECT SEED

It is recognized that an occasional year occurs when even the early maturing varieties and strains will not ripen. It is therefore a good plan to select and save enough ears for at least two years. When there is danger of early fall frosts it is well to select the seed plants and gather the ears as soon as the corn is mature enough to make seed. Flint varieties may be gathered as soon as flinting appears and dent varieties when they start to dent.

METHODS OF HARVESTING SEED CORN

If only enough seed for home use is to be saved harvesting is very simple. By hanging a bag over the shoulder two rows can be taken at a time and the ears selected and husked from desirable plants. Eight or nine bushel baskets of ears will produce about two bushels of shelled corn.

When seed is to be harvested in bulk it will be found advisable to husk the ears from each plant and throw directly into a wagon box. It is a common practice to have an extra side board on the opposite side of the box to which the huskers are working so that ears may be tossed against it to ensure them falling into the box. A husking peg or hook will make the work of husking much easier and faster.

CARE OF SEED CORN

It is necessary that great precaution be taken at harvest to properly dry and store the ears of seed corn to prevent damage from moulding and freezing. Corn is often seriously damaged by careless treatment after harvesting.

Seed corn when brought in from the field contains at least thirty or forty per cent of moisture. The object of storing and drying is to reduce this moisture content as rapidly as possible to prevent damage from either disease or freezing. To reduce the percentage of moisture the ears should be either hung or placed in racks in a dry, well-ventilated room. A fire is often kept in the drying room, but when only a little corn is stored and there is a good circulation of air this may not be necessary. When dry, seventy pounds of ears will give about fifty-six pounds of shelled corn.

Many methods have been devised for hanging or holding seed ears. Some plat the husks together and thus hang the ears in strings. There are several useful devices for holding small lots of corn.

Fig. 4 is a device made by driving finishing nails into boards or planks which may be hung on the wall. Fig. 4B is a corn tree and is made by driving finishing nails into an upright post supported by a suitable base. Fig. 4C is a device made from small mesh fencing and the cross wires are cut and the ears may be stuck into the cut ends as in diagram.

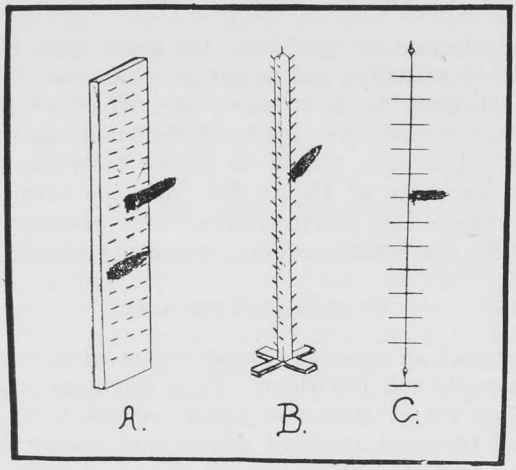


Fig. 4.—Devices for holding and drying seed corn.

For larger quantities a rack is made of fairly large size mesh chicken wire nailed on either side of a 2 by 4 frame work (see fig. 5). The frame is made about five feet square and the wire nailed on each side of the rack with the meshes opposite each other so that an ear of corn will be kept in a horizontal position when stuck through the meshes.

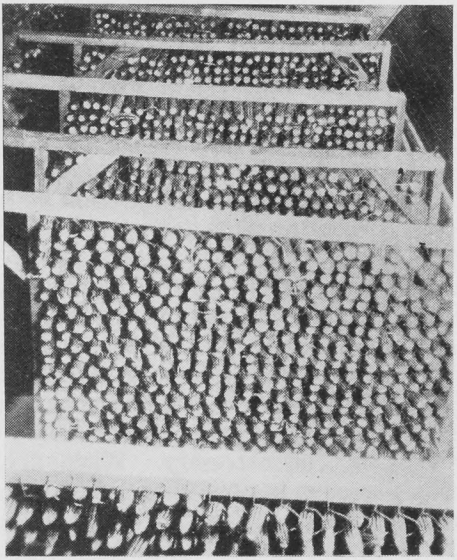


Fig. 5.—Corn in drying racks, Experimental Farm, Brandon.

For farmers who are specializing in seed corn production several devices have been worked out for the purpose of forcing heat through a bin. A furnace and blower or fan is used to force heat through the corn. Care should be taken, however, not to have the air over 150 degrees or below 100 degrees.

Fig. 6 shows a diagram of the Wisconsin seed corn drier. It is made of bins 4 by 4 feet arranged in two rows with an alley between them. Bins and alley are air tight. Warm air is forced into the alley and conveyed into the top or bottom of each bin by means of dampers as desired.

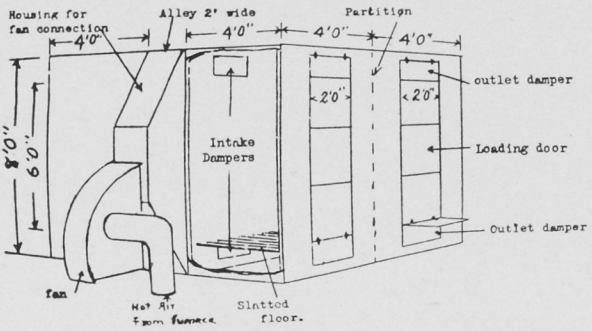


Fig. 6.—Diagram of Wisconsin seed corn drier.

To obtain information on the number of bins, the size of the fan, capacity of furnace and horse power write the Dominion Experimental Farm, Brandon.

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